Deep Space Network Operations and Maintenance

Request for Proposal

Industry Briefing

February 18-20, 2003

National Aeronautics and Space Administration

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Product Development and Deployment Process

Presentation Topics

- Overview of the DSN Subsystem Hierarchy

- Overview of the DSN Product Development and Deployment Process

- Key Aspects of the Engineering/Operations Interface

- Levels and Scope of Contractor Engineering Responsibility
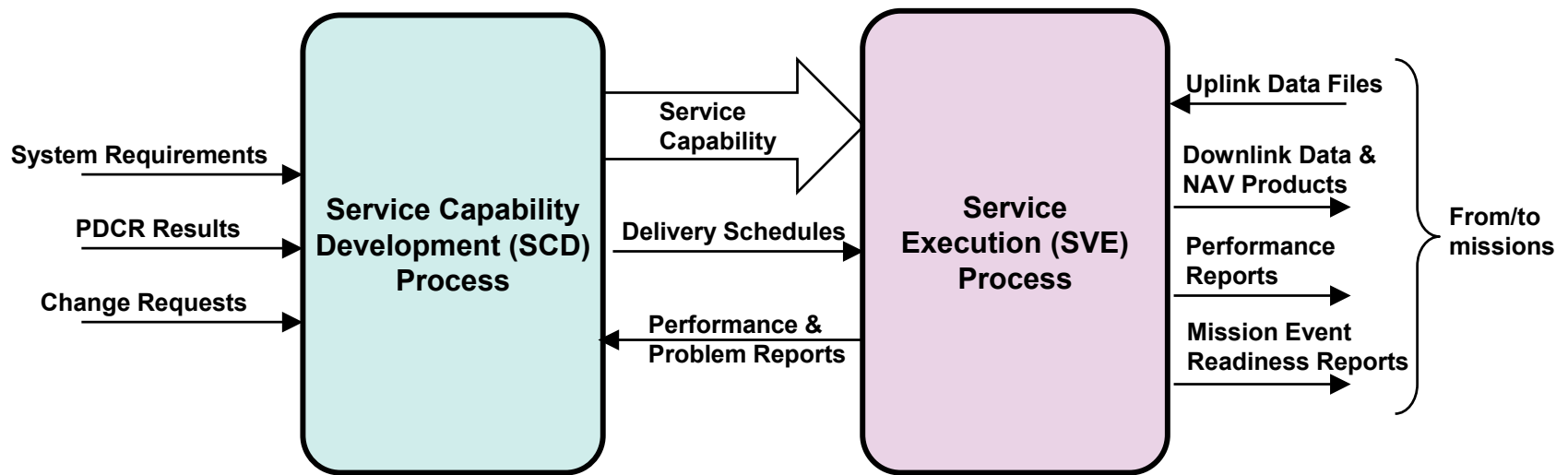
DSN Product and Process Overview

- DSMS Document 820-061 (and the associated database) defines the set of subsystems and the lower-level hardware/software products that comprise the Network

  - 44 'Operational' Subsystems

  - 3 'Information Services and Tools' Subsystems

  - 3 'R&D' Subsystems

- Technical responsibility for each subsystem is assigned to a Subsystem Engineer (SSE); a Cognizant Development Engineer (CDE) is assigned for each subsystem assembly (hardware) or program (software) element.

- Each subsystem is under the programmatic cognizance of a JPL Service/System Manager (SSM)

- The DSMS 'Service Capability Development' (SCD) process (see DSMS 813-011) defines the life-cycle used for development and deployment of new or modified Network products, which are operated/maintained within the 'Service Execution' (SVE) process.

DSN Product and Process Overview
(continued)

Key Process Interfaces

System Requirements →

PDCR Results →

Change Requests →

Service Capability Development (SCD) Process

Service Capability →

Delivery Schedules →

← Performance & Problem Reports

Service Execution (SVE) Process

← Uplink Data Files

Downlink Data & NAV Products →

Performance Reports →

Mission Event Readiness Reports →

From/to missions

Note: DSN Operations and Contractor personnel participate in the SCD process
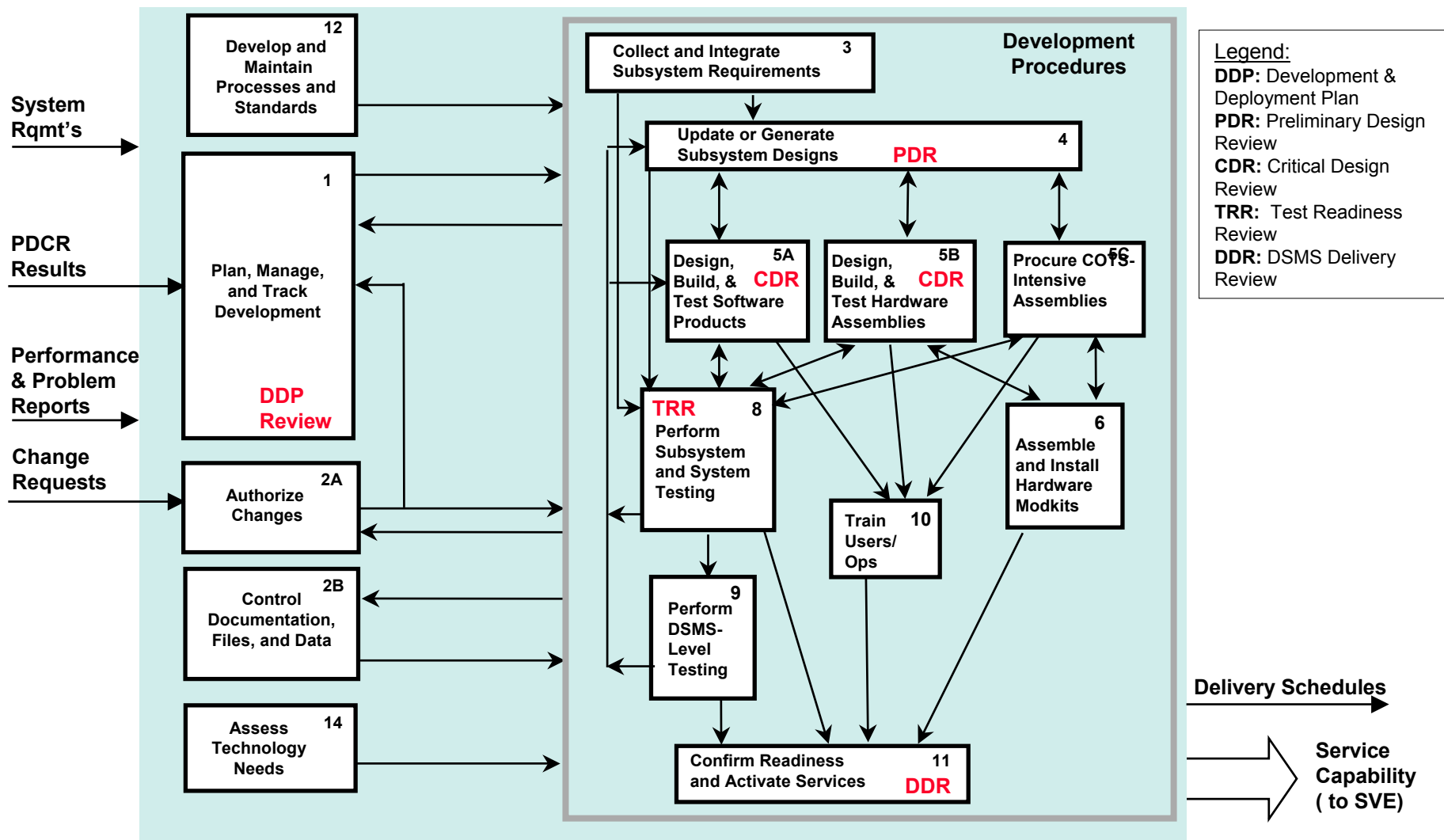
DSN Product and Process Overview
(continued)

- The SCD process includes all implementation activities from design through installation and operational activation. Some key characteristics:

  - Acceptance testing is performed by DSN Operations personnel

  - A formal product transfer occurs (for operation and maintenance) for each revision of the product (see 813-125 and 813-126). Addresses documentation, training, safety.

  - Products are provided in 'modkits' to central logistics facility for distribution to operational sites

- It also includes key supporting activities such as:

  - Product CM during deployment/delivery phases

  - Product documentation and training standards

- Other SCD standards address items such as:

  - Reviews (813-101)

  - Testing (813-112)

  - Hardware Design (813-202)

  - Spares Provisioning (813-205)

  - System Cabling (813-207)

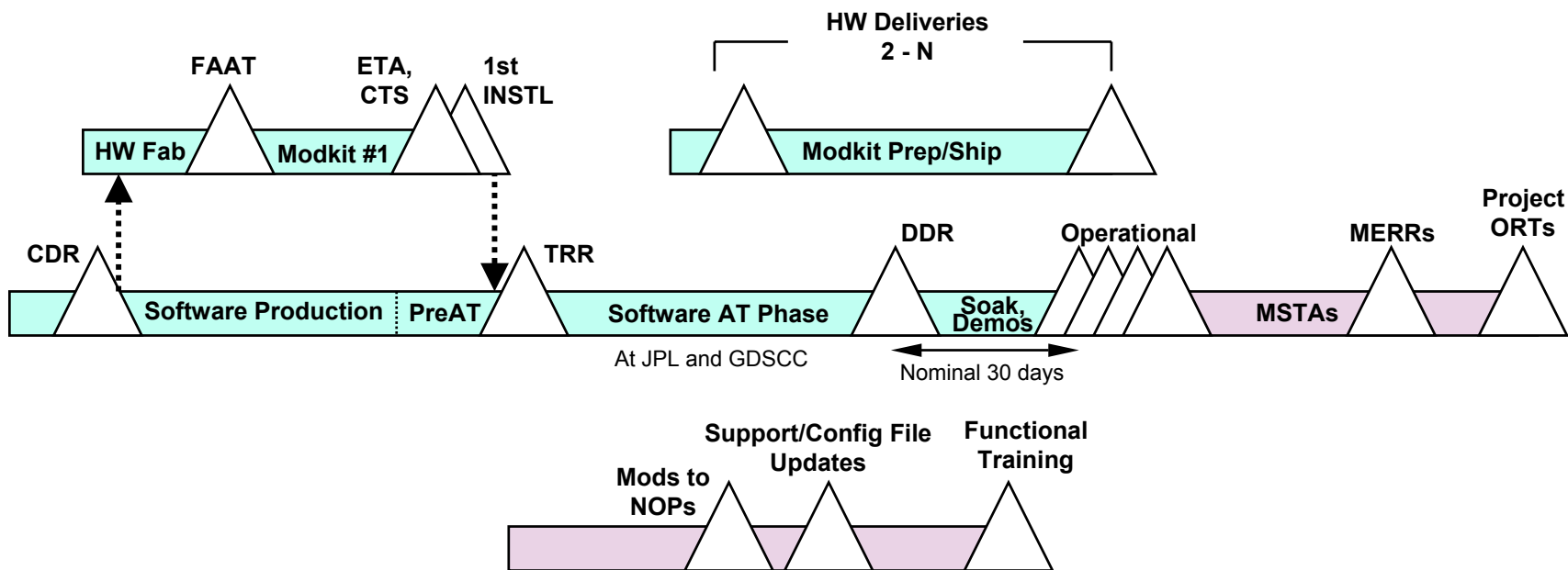 - Software Classifications (813-024)

SCD Process Procedures

Development Procedures

12 Develop and Maintain Processes and Standards

3 Collect and Integrate Subsystem Requirements

4 Update or Generate Subsystem Designs — **PDR**

1 Plan, Manage, and Track Development — **DDP Review**

5A Design, Build, & Test Software Products — **CDR**

5B Design, Build, & Test Hardware Assemblies — **CDR**

5C Procure COTS-Intensive Assemblies

8 Perform Subsystem and System Testing — **TRR**

6 Assemble and Install Hardware Modkits

2A Authorize Changes

10 Train Users/Ops

2B Control Documentation, Files, and Data

9 Perform DSMS-Level Testing

14 Assess Technology Needs

11 Confirm Readiness and Activate Services — **DDR**

System Rqmt's

PDCR Results

Performance & Problem Reports

Change Requests

Delivery Schedules

Service Capability (to SVE)

Legend:
DDP: Development & Deployment Plan
PDR: Preliminary Design Review
CDR: Critical Design Review
TRR: Test Readiness Review
DDR: DSMS Delivery Review

Typical Process Timeline for Development & Deployment

CTS: Consent-to-Ship (meeting)
ETA: Equipment Transfer Agreement
FAAT: First Article Acceptance Test
MSTA: Mission Services Training Activity
NOP: Network Operations Plan

Contractor Product Engineering Responsibilities

- Three responsibility levels of have been established

    - Subsystem (includes all CDE and sustaining support activities)

    - Hardware or software CDE responsibility (includes all required sustaining support activities)

    - Product sustaining support only

- The assigned levels of responsibility are linked to the configuration items listed in the 820-061 Database (See TDD, Appendix I)

- The assignments may be revised on an annual basis

- All work must be in accordance with the SCD process

- Major upgrade or sustaining tasks will be established as directed efforts.

Contractor Product Engineering Responsibilities
(continued)

- Contractor subsystem engineering responsibilities for assigned subsystems:

  – Generate, update, and review subsystem designs and interface agreements

  – Develop subsystem modifications in accordance with approved development/deployment plans

  – All CDE functions within the subsystem (see below)

- Contractor CDE responsibilities for assigned products:

  – Design and delivery of specific subsystem components (per 813-series standards)

  – Deliveries per 813-125 and 813-126 standards

  – Work to schedule approved by cognizant JPL SSM

- Contractor sustaining support provides:

  – Technical and modkit preparation support to JPL for minor subsystem modifications